



Stafford County, Virginia  
Chesapeake Bay TMDL Action Plan

Original Submission to DEQ June 30, 2015

Updated June 30, 2016



# 1 INTRODUCTION

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## 1.1 PURPOSE

This Chesapeake Bay TMDL Action Plan builds on Stafford County’s longstanding commitment to efficient and effective stormwater management. Since 2003, the County has implemented a stormwater management program for land development activities that is more stringent than minimum state requirements. The approach that began in 2003 included a focus on the implementation of low impact development technology for stormwater management. In fact, the County’s 2003 Stormwater Management Ordinance used technology-based requirements and mandated stormwater treatment for any increase in impervious surface (i.e., a more stringent 0% threshold for triggering stormwater controls rather than the state default of 16%).

The Chesapeake Bay TMDL Action Plan documents how Stafford County intends to meet the “Special Condition for the Chesapeake Bay TMDL” in Section I, Part C of the County’s General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The County’s most recent permit (VAR040056) was issued by the Virginia Department of Environmental Quality (DEQ) effective July 1, 2013 and will expire June 30, 2018.

The County’s MS4 permit requires the development and implementation of action plans for impaired streams where a Total Maximum Daily Load (TMDL) assigns a waste load allocation to the County that has been approved by the State Water Control Board. A TMDL establishes the maximum amount of a pollutant that can enter a water body without violating water quality standards.

A TMDL for the Chesapeake Bay was established by the US Environmental Protection Agency in 2010. Pollutants of concern (POCs) identified for the Chesapeake Bay include total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS). Virginia subsequently developed and adopted a Watershed Implementation Plan (WIP) that establishes the framework for meeting the Chesapeake Bay TMDL. The Virginia WIP states that MS4 permit holders will implement a phased approach for meeting required reductions over three five-year permit cycles in accordance with the following: 5% of required reductions by the end of the first permit cycle (June 30, 2018); a total of 40% of required reductions by the end of the second permit cycle; and 100% of required reductions by the end of the third permit cycle.

The Chesapeake Bay TMDL Action Plan establishes the 5% reduction target and the means and methods for achieving the reduction target in accordance with the MS4 permit and the Chesapeake Bay TMDL Special Conditions Guidance developed by DEQ (Guidance Memo No 15-2005, dated May 18, 2015) including its assurances on credit guarantees and reductions beyond the required 5% for this permit cycle.

## 1.2 PERMIT COMPLIANCE CROSSWALK

Table 1A provides each of the requirements of the County’s MS4 permit and the specific section where the requirement is addressed in this Chesapeake Bay TMDL Action Plan.



Table 1A – Action Plan and Permit Compliance Crosswalk

Action Plan	Action Plan Element	MS4 Permit	MS4 Permit Requirement
Section 2.1	Current Program and Existing Legal Authority	Section I.C.2.a(1)	A review of the current MS4 program implemented as a requirement of this state permit including a review of the existing legal authorities and the operator’s ability to ensure compliance with this special condition.
Section 2.2	New or Modified Legal Authority	Section I.C.2.a(2)	The identification of any new or modified legal authorities such as ordinances, state and other permits, orders, specific contract language, and inter-jurisdictional agreements implemented or needing to be implemented to meet the requirements of this special condition.
Section 3	Means and Methods to Address Discharges from New Sources	Section I.C.2.a(3)	The means and methods that will be utilized to address discharges into the MS4 from new sources.
Section 4	Estimated Existing Source Loads and Calculated Total Pollutants of Concern (POC) Required Reductions	Section I.C.2.a(4) and Section I.C.2.a(5)	An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009, based on the 2009 progress run. The operator shall utilize the applicable versions of Tables 2 a-d in this section based on the river basin to which the MS4 discharges by multiplying the total existing acres served by the MS4 on June 30, 2009 and the 2009 Edge of Stream (EOS) loading rate. A determination of the total pollutant load reductions necessary to reduce the annual POC loads from existing sources utilizing the applicable versions of Tables 3 a-d in this section based on the river basin to which the MS4 discharges. This shall be calculated by multiplying the total existing acres served by the MS4 by the first permit cycle required reduction in loading rate. For the purpose of this determination, the operator shall utilize those existing acres identified by the 2000 U.S. Census Bureau urbanized area and served by the MS4.
Section 5	Means and Methods	Section I.C.2.a(6)	The means and methods, such as best



Action Plan	Action Plan Element	MS4 Permit	MS4 Permit Requirement
	to Meet the Required Reductions and Schedule		management practices and retrofit programs that will be utilized to meet the required reductions included in subdivision 2.a(5) of this subsection, and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions.
Section 6	Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014	Section I.C.2.a(7)	The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014 that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids. The operator shall offset 5.0% of the calculated increased load from these new sources during the permit cycle.
Section 7	Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction after July 1, 2014	Section I.C.2.a(8)	The means and methods to offset the increased loads from projects as grandfathered in accordance with 4VAC50-60-48 that disturb one acre or greater that begin construction after July 1, 2014, where the project utilizes an average land cover condition greater than 16% impervious cover in the design of post-development stormwater management facilities. The operator shall utilize Table 4 in this section to develop the equivalent pollutant load for nitrogen and total suspended solids.
Section 8	List of Future Projects, and Associated Acreage that Qualify as Grandfathered	Section I.C.2.a(10)	A list of future projects and associated acreage that qualify as grandfathered in accordance with 4VAC50-60-48.
Section 9	Estimated Expected Cost to Implement	Section I.C.2.a(11)	An estimate of the expected costs to implement the requirements of this



Action Plan	Action Plan Element	MS4 Permit	MS4 Permit Requirement
	Necessary Reductions		special condition during the state permit cycle.
Section 10	Public Comments on Draft Action Plan	Section I.C.2.a(12)	An opportunity for receipt and consideration of public comment regarding the draft Chesapeake Bay TMDL Action Plan. A list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.

### 1.3 ADAPTIVE MANAGEMENT

As noted in Section II.F of the MS4 permit, modifications to the TMDL Action Plan “are expected throughout the life of this state permit as part of the iterative process to reduce the pollutant loadings and to protect water quality.” As part of this iterative process for reducing pollutant loadings, the County reserves the discretion to carry out pollutant reduction activities that may vary from the details of the current Action Plan while still meeting or exceeding the minimum pollutant reduction requirements of the MS4 permit. This adaptive management may include but is not limited to (a) selection or substitution of alternative projects or other means or methods based on cost effectiveness, site constraints, permitting or other factors, (b) documentation of credit from projects not represented in this Action Plan, (c) implementation of new or alternative BMPs, and (d) pollutant credit trading. In all cases, credit calculation will be in accordance with good engineering practice and applicable policy and guidance.

## 2 CURRENT PROGRAM AND LEGAL AUTHORITY

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### 2.1 CURRENT PROGRAM AND EXISTING LEGAL AUTHORITY

The County has adopted an MS4 Program Plan that documents implementation of all MS4 permit requirements, including the programmatic and legal authorities required to meet the “Special Condition for the Chesapeake Bay TMDL.” The full MS4 Program Plan can be found online at <http://staffordcountyva.gov/DocumentCenter/View/5690>. Table 2A provides a summary of elements of the six minimum control measures (MCMs) implemented by the County under the MS4 permit that relate to controlling total nitrogen, total phosphorus, and total suspended solids.

*Table 2A – MS4 Program Plan Components Related to Meeting the Chesapeake Bay TMDL*

Minimum Control Measure	MS4 Program Plan Elements Related to Controlling Total Nitrogen, Total Phosphorus, and Total Suspended Solids
Public Education and Outreach on Stormwater Impacts.	The County’s MS4 Public Education & Outreach Program addresses nutrients and sediment through the following activities: <ul style="list-style-type: none"> <li>• Distribution of printed materials at community events and businesses</li> </ul>



Minimum Control Measure	MS4 Program Plan Elements Related to Controlling Total Nitrogen, Total Phosphorus, and Total Suspended Solids
	<ul style="list-style-type: none"> <li>• Distribution of printed media materials at the County Government Center and public libraries</li> <li>• Providing internet access to stormwater management and stormwater pollution prevention materials from the County's Department of Public Works webpage</li> <li>• Participation in the Northern Virginia Regional Commission's Clean Water Partners regional stormwater education media campaign</li> <li>• Operation of a stormwater pollution hotline for citizen complaints</li> </ul>
Public Involvement and Participation	<p>The County has designed a program to involve the public in the decision-making process by:</p> <ul style="list-style-type: none"> <li>• meeting all public notice requirements</li> <li>• providing hard copies of the annual report at the County Government Center and public libraries</li> <li>• promoting Adopt-a-Stream Program opportunities</li> <li>• promoting the County's storm drain marking program</li> <li>• promoting at least four local activities such as Earth Day on the Rappahannock and the Wild &amp; Scenic Film Festival, as well as the Rappahannock River Cleanup and the Save the Crabs Campaign, which is a combination of multiple events organized by the Friends of the Rappahannock</li> </ul>
Illicit Discharge Detection and Elimination	<p>The County has integrated into its MS4 Program Plan an Illicit Discharge Detection and Elimination Program. This program includes preventing, identifying, and eliminating sources of pollutants, including total nitrogen and total phosphorus as well as total suspended solids.</p>
Construction Site Stormwater Runoff Control	<p>The County's construction site stormwater runoff control program is designed to be fully consistent with the water quality control requirements of the Virginia Erosion and Sediment Control Act and the Virginia Stormwater Management Act, and their attendant regulations. See the Stafford County Code of Ordinances Chapter 11, Erosion and Sediment Control and Chapter 21.5, Stormwater Management. The latest update of the Stafford County Stormwater Management Design Manual was completed in March 2014 (4<sup>th</sup> Addition) includes procedures for the County's Erosion &amp; Sediment Control Program's inspection process.</p>
Post-Construction Stormwater Management	<p>The County's post-construction stormwater management program is designed to be fully consistent with the water quality control requirements of the Virginia Stormwater Management Act and its attendant regulations. See the Stafford County Code of Ordinances Chapter 21.5, Stormwater Management. The stormwater facility inspection program is outlined in the County's VSMP Compliance &amp; Enforcement Policy and Procedures document as well as the County's Stormwater Management Design Manual (4<sup>th</sup> Addition),</p>



Minimum Control Measure	MS4 Program Plan Elements Related to Controlling Total Nitrogen, Total Phosphorus, and Total Suspended Solids
	March 2014. Finally, the County implemented the County Owned/Operated Stormwater Management Facility Inspection & Maintenance (I&M) Procedures manual.
Pollution Prevention and Good Housekeeping for Municipal Operations	The County has included in its MS4 Program Plan actions to meet the pollution prevention and good housekeeping requirements for municipal operations. This includes general good housekeeping, as well as specific requirements to develop nutrient management plans for all properties where nutrients are applied to more than one contiguous acre.

### 2.2 NEW OR MODIFIED LEGAL AUTHORITY

After review of the County’s existing MS4 Program Plan and legal authorities, the County finds that no additional legal authorities are required for compliance with the “Special Condition for the Chesapeake Bay TMDL.”

## 3 MEANS AND METHODS TO ADDRESS DISCHARGES FROM NEW SOURCES

The County must identify and implement the means and methods necessary to address discharges into the MS4 from new sources. Any new source that disturbs one acre or greater and utilizes an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities must be offset in accordance with Section I.C.2.a(3) of the permit. Stafford County has implemented an effective and more stringent stormwater management program for land development activities since 2003 with a focus on the implementation of low impact development technology for stormwater management. The County’s 2003 SWM Ordinance used technology-based requirements and mandated stormwater treatment for any increase in impervious surface exceeding 0%. This exceeds the state minimum requirement of treating increases in impervious area beyond the State default amount of 16%. Thus, between July 1, 2009 and June 30, 2014, the County utilized these standards and no offsets are required to be addressed by this plan (see Section 6).

The County Board of Supervisors has adopted stringent new stormwater quality requirements (County Code Chapter 21.5, “Stormwater Management”) that meet or exceed the state’s minimum requirements for discharges from new sources. The County was approved as a Virginia Stormwater Management Program (VSMP) by DEQ on June 26, 2014. The new requirements, which became effective July 1, 2014, meet the requirements of the Virginia Stormwater Management Act (§62.1-44.15:24 et seq, Code of Virginia), the Erosion and Sediment Control Act (§62.1-44.15:51 et seq, Code of Virginia), the Chesapeake Bay Preservation Act (§62.1-44.15:67 et seq, Code of Virginia), and their attendant regulations.

The County’s ordinance applies to any land-disturbing activity 2,500 square feet and greater, regardless of land use type, which is more stringent than the one acre threshold required in the permit and the Virginia Stormwater Management Regulations (9VAC25-870). All new development must meet a standard of 0.41 pounds of phosphorus per acre per year. All redevelopment must reduce the phosphorus load by 20% if the land disturbance is one acre or greater or by 10% if the land disturbance



is less than one acre (not to exceed the 0.41 standard for new development). The standard of 0.41 pounds of phosphorus per acre per year is mandated by the Virginia Stormwater Management Regulations, and according to DEQ's guidance meets the requirement for no-net-increase from new sources.

A full copy of the County's stormwater management ordinance can be found at the following website: [https://www.municode.com/library/va/stafford\\_county/codes/code\\_of\\_ordinances?nodeId=COCO\\_CH21.5STMA](https://www.municode.com/library/va/stafford_county/codes/code_of_ordinances?nodeId=COCO_CH21.5STMA).

## 4 ESTIMATED EXISTING SOURCE LOADS AND CALCULATED TOTAL POLLUTANT OF CONCERN (POC) REQUIRED REDUCTIONS

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The following sections describe the methodology used by the County to estimate existing POC source loads. In accordance with the MS4 permit, the County must estimate the annual POC loads discharged from existing sources as of June 30, 2009, based on the 2009 progress run. Completed calculation tables from the permit are included in Table 4A.

### 4.1 MS4 SERVICE AREA DELINEATION METHODOLOGY

Stormwater outfalls owned or operated by Stafford County were identified using desktop-based geographic information systems (GIS). Aerial imagery, topography, and storm sewer systems data was reviewed within the 2000 and 2010 Census Urbanized Area boundaries. County parcel data was used to distinguish between County MS4 outfalls, VDOT MS4 outfalls, and private outfalls. Outfall locations were confirmed via field investigations.

Drainage areas to County MS4 outfalls were delineated using a combination of automated and manual GIS processes. A hydrologically-enforced digital elevation model (DEM) was developed from 2-foot contours to enable automatic delineation of MS4 outfall drainage areas. Where available, construction plans were digitized and georeferenced in order to capture MS4 outfall drainage areas as accurately as possible.

The County's regulated MS4 area is comprised of lands draining to County-owned or operated MS4 outfalls. This includes the outfalls of four major regional stormwater management ponds as well as County-owned property. The regional facilities are:

1. Stafford Lakes Regional Pond 2A
2. Stafford Lakes Regional Pond 4A
3. Manheim Auto Auction Regional Pond
4. Embrey Mill Regional Pond 5

Drainage in the road right-of-way is maintained by VDOT. Other drainage is maintained by the property owner or the property owner's association, including outfalls in drainage easements on private property not maintained by the County.



The MS4 service area was revised in August 2016 to remove areas identified as being regulated under other Phase II permits. Specifically, this includes areas identified by VDOT, Stafford County Public Schools, and the University of Mary Washington in their respective Chesapeake Bay TMDL action plans.

#### 4.2 PERVIOUS AND IMPERVIOUS SURFACE DELINEATION METHODOLOGY

The County worked with the Virginia Geographic Information Network to develop a County-wide impervious cover polygon GIS layer based on aerial imagery captured in 2013. This layer was subsequently used to develop a 2009 impervious cover layer corresponding to the Census Urbanized Area, based on aerial imagery captured in 2009. Roads and buildings constructed since 2009 were removed from the 2013 impervious cover dataset, and other adjustments were made to the layer in order to accurately reflect 2009 conditions.

#### 4.3 ESTIMATED EXISTING SOURCE LOADS

The County must estimate the total existing source loads for total nitrogen, total phosphorus, and total suspended solids as of June 30, 2009 based on the 2009 Chesapeake Bay Model progress run and using 2009 Edge of Stream (EOS) loading rates. Since the County straddles the Potomac River and Rappahannock River watersheds, the 2009 EOS loading rates from both Table 2b and Table 2c of the MS4 permit must be used. The County has a total of 988.32 acres served by the regulated MS4.

*Table 4.3.A – Estimated Existing Source Loads, Potomac River Watershed*

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/2009)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	43.18	16.86	728.01
Regulated Urban Pervious		253.06	10.07	2,548.31
Regulated Urban Impervious	Phosphorus	43.18	1.62	69.95
Regulated Urban Pervious		253.06	0.41	103.75
Regulated Urban Impervious	Total Suspended Solids	43.18	1171.32	50,577.60
Regulated Urban Pervious		253.06	175.8	44,487.95



*Table 4.3.B – Estimated Existing Source Loads, Rappahannock River Watershed*

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/2009)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)
Regulated Urban Impervious	Nitrogen	222.58	9.38	2,087.80
Regulated Urban Pervious		469.50	5.34	2,507.13
Regulated Urban Impervious	Phosphorus	222.58	1.41	313.84
Regulated Urban Pervious		469.50	0.38	178.41
Regulated Urban Impervious	Total Suspended Solids	222.58	423.97	94,367.24
Regulated Urban Pervious		469.50	56.01	26,296.70

#### 4.4 REQUIRED REDUCTIONS FROM EXISTING SOURCE LOADS

The reductions from the estimated sources loads (loads in existence as of June 30, 2009) in Table 4.3.A and Table 4.3.B must be calculated using Table 3b and Table 3c of the MS4 permit. Tables 4.4.A and 4.4.B show the completed calculations from permit Tables 3b and 3c, respectively.

*Table 4.4.A – Required Reductions from Estimated Existing Source Loads, Potomac River Watershed*

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/2009)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	43.18	0.07587	3.28
Regulated Urban Pervious		253.06	0.03021	7.64
Regulated Urban Impervious	Phosphorus	43.18	0.01296	0.56
Regulated Urban Pervious		253.06	0.00148625	0.38
Regulated Urban Impervious	Total Suspended Solids	43.18	11.7132	505.78
Regulated Urban Pervious		253.06	0.769125	194.63



Table 4.4.B – Required Reductions from Estimated Existing Source Loads, Rappahannock River Watershed

Subsource	Pollutant	Total Existing Acres Served by MS4 (06/30/2009)	First Permit Cycle Required Reduction in Loading Rate (lbs/acre/yr)	Total Reduction Required First Permit Cycle (lbs/yr)
Regulated Urban Impervious	Nitrogen	222.58	0.04221	9.40
Regulated Urban Pervious		469.50	0.01602	7.52
Regulated Urban Impervious	Phosphorus	222.58	0.01128	2.51
Regulated Urban Pervious		469.50	0.0013775	0.65
Regulated Urban Impervious	Total Suspended Solids	222.58	4.2397	943.67
Regulated Urban Pervious		469.50	0.24504375	115.05

## 5 MEANS AND METHODS TO MEET REQUIRED REDUCTIONS AND SCHEDULE

This section describes the means and methods by which the County will achieve the 5% reduction required for source loads in existence as of June 30, 2009 as calculated in Section 4. Reductions will be achieved through structural Best Management Practices (BMPs) targeted in the Potomac River and Rappahannock River watersheds. The County reserves the right to take credit for additional means and methods that may be implemented during the current permit cycle in accordance with DEQ’s Chesapeake Bay TMDL Special Conditions Guidance. Additionally, the County is optimistic that its progress is likely to exceed the 5% reduction target applicable during this cycle. In that event, pollution reduction credit achieved beyond the 5% reduction requirement in this permit cycle will apply towards the 40% and/or 100% reduction requirements anticipated in future permit cycles as provided in Part III of DEQ’s Chesapeake Bay TMDL Special Conditions Guidance.

### 5.1 POTOMAC RIVER WATERSHED

#### 5.1.1 County-Initiated Projects

Stafford County was awarded a Stormwater Local Assistance Fund matching grant for the design and construction of a stormwater BMP retrofit at the Stafford County Government Center, located at 1300 Courthouse Road. Due to site constraints, this project is no longer moving forward and is, therefore, removed from this TMDL action plan.

The County plans, however, to retrofit two existing ponds in the Potomac River watershed. DP257, a dry pond, is located adjacent to Highpointe Boulevard. DP339, also a dry pond, is located adjacent to Park Cove Drive. Both ponds are located within HUC 020700110203 (Lower Aquia Creek), outside of the



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County's regulated MS4 area. The following tables summarize estimated nutrient and sediment reductions from the DP257 and DP339 pond retrofits. Per DEQ's Chesapeake Bay TMDL Action Plan Guidance, estimated reductions from these projects have been discounted to account for baseline reductions required on unregulated impervious and pervious lands.

Project	DP257 Pond Retrofit		TN	TP	TSS
<b>Date Planned</b>	2015	<b>Efficiencies**</b>	31.4%	49.3%	62.7%
<b>Drainage Area</b>	149.02	<b>Est. Reductions*</b>	221.88	19.29	16,088.69
<i>Impervious</i>	<i>41.34</i>	<b>Calculation Method</b>	Retrofit Curves - ST		
<i>Pervious</i>	<i>33.68</i>				
<i>Forest</i>	<i>74.00</i>	<b>Depth Treated</b>	0.73 in.		

**\*Est. Reduction Calculation Details**

TN	Initial TN Reduction = 304.96
	TN Baseline Reduction = $[0.07587 \text{ (Loading Rate Urban Impervious)} * 20 * 41.34 \text{ (Unregulated Impervious Acres Draining to Facility)}] + [0.03021 \text{ (Loading Rate Urban Pervious)} * 20 * 33.68 \text{ (Unregulated Pervious Acres Draining to Facility)}] = 83.08$
	Creditable TN Reduction = $304.96 - 83.08 = 221.88$
TP	Initial TP Reduction = 31.01
	TP Baseline Reduction = $[0.01296 \text{ (Loading Rate Urban Impervious)} * 20 * 41.34 \text{ (Unregulated Impervious Acres Draining to Facility)}] + [0.00148625 \text{ (Loading Rate Urban Pervious)} * 20 * 33.68 \text{ (Unregulated Pervious Acres Draining to Facility)}] = 11.72$
	Creditable TP Reduction = $31.01 - 11.72 = 19.29$
TSS	Initial TSS Reduction = 26,291.25
	TSS Baseline Reduction = $[11.7132 \text{ (Loading Rate Urban Impervious)} * 20 * 41.34 \text{ (Unregulated Impervious Acres Draining to Facility)}] + [0.769125 \text{ (Loading Rate Urban Pervious)} * 20 * 33.68 \text{ (Unregulated Pervious Acres Draining to Facility)}] = 10,202.56$
	Creditable TSS Reduction = $26,291.25 - 10,202.56 = 16,088.69$

\*\* Efficiencies reflect the efficiency of the new BMP minus the efficiency of the old BMP.

Project	DP339 Pond Retrofit		TN	TP	TSS
<b>Date Planned</b>	2015	<b>Efficiencies**</b>	40%	64%	81%
<b>Drainage Area</b>	35.61	<b>Est. Reductions*</b>	95.90	9.85	7,982.08
<i>Impervious</i>	<i>12.48</i>	<b>Calculation Method</b>	Retrofit Curves - ST		
<i>Pervious</i>	<i>16.62</i>				
<i>Forest</i>	<i>6.51</i>	<b>Depth Treated</b>	2.76 in.		

**\*Est. Reduction Calculation Details**

TN	Initial TN Reduction = 124.88
	TN Baseline Reduction = $[0.07587 \text{ (Loading Rate Urban Impervious)} * 20 * 12.48 \text{ (Unregulated Impervious Acres Draining to Facility)}] + [0.03021 \text{ (Loading Rate Urban Pervious)} * 20 * 16.62 \text{ (Unregulated Pervious Acres Draining to Facility)}] = 28.98$
	Creditable TN Reduction = $124.88 - 28.98 = 95.90$
TP	Initial TP Reduction = 13.58
	TP Baseline Reduction = $[0.01296 \text{ (Loading Rate Urban Impervious)} * 20 * 12.48 \text{ (Unregulated Impervious Acres Draining to Facility)}] + [0.00148625 \text{ (Loading Rate Urban Pervious)} * 20 * 16.62 \text{ (Unregulated Pervious Acres Draining to Facility)}] = 11.72$



	Urban Pervious) * 20 * 16.62 (Unregulated Pervious Acres Draining to Facility)] = 3.73
	Creditable TP Reduction = 13.58 – 3.73 = 9.85
TSS	Initial TSS Reduction = 11,161.35
	TSS Baseline Reduction = [11.7132 (Loading Rate Urban Impervious) * 20 * 12.48 (Unregulated Impervious Acres Draining to Facility)] + [0.769125 (Loading Rate Urban Pervious) * 20 * 16.62 (Unregulated Pervious Acres Draining to Facility)] = 3,179.27
	Creditable TSS Reduction = 11,161.35 – 3,179.27 = 7,982.08

\*\* Efficiencies reflect the efficiency of the new BMP minus the efficiency of the old BMP.

### 5.1.2 Stormwater Facilities Installed Between January 2006 and July 2009

In accordance with the Chesapeake Bay TMDL Special Condition Guidance (Part IV.2 and Appendix VI), the County may receive full credit for stormwater management facilities that were initially installed on or after January 1, 2006 and prior to July 1, 2009 within the regulated MS4 service area provided that the County has submitted a full account of stormwater facilities to DEQ as part of the “Historical Data Clean-Up” effort. Facility data was submitted to DEQ by the September 1, 2015 deadline and has been revised since that time to provide more detail on facility installation dates. Thirteen qualifying projects have been identified by the County in the Potomac River watershed, which are included in Appendix A. The summary of reductions from these facilities is below:

	<b>Total Nitrogen Reduction (lbs)</b>	<b>Total Phosphorus Reduction (lbs)</b>	<b>Total Suspended Solids Reduction (lbs)</b>
<b>Total</b>	218.13	33.50	30,621.21

### 5.1.3 Compliance Demonstration

The following table summarizes estimated baseline loads from regulated MS4 areas, 5% reduction targets, and estimated load reductions from planned projects and historical BMPs within the Potomac River watershed.

	<b>TN (lbs/yr)</b>	<b>TP (lbs/yr)</b>	<b>TSS (lbs/yr)</b>
<b>Baseline Loads</b>	<b>3,276.33</b>	<b>173.71</b>	<b>95,065.55</b>
<b>5% Reduction Targets</b>	<b>10.92</b>	<b>0.94</b>	<b>700.41</b>
<b>Estimated Reductions</b>			
DP257 Pond Retrofit	221.88	19.29	16,088.69
DP339 Pond Retrofit	95.90	9.85	7,982.08
Historic BMPs	218.13	33.50	30,621.21
<b>Total Estimated Reductions</b>	<b>535.91</b>	<b>62.64</b>	<b>54,691.98</b>

For the Potomac River basin portion of the MS4, the calculated POC load reductions associated with the above list demonstrates that not all listed projects are necessary for compliance purposes. The County will determine which project or combination of projects to implement and document that decision in future reports.



## 5.2 RAPPAHANNOCK RIVER WATERSHED

### 5.2.1 County-Initiated Projects

Stafford County is currently investigating stormwater treatment project options in the Rappahannock River watershed. Several potential BMP retrofits have already been identified, including bioretention and infiltration trench facilities at St. Clair Brooks Memorial Park (80 Butler Road). A bioretention facility at John Lee Pratt Memorial Park (120 River Rd) was evaluated and has been removed from this action plan because it was determined to not be viable.

The following projects are located within HUC 020801040102 (Rappahannock River – Hazel Run), outside of the County’s regulated MS4 area. Per DEQ’s Chesapeake Bay TMDL Action Plan Guidance, estimated reductions from these projects have been discounted to account for baseline reductions required on unregulated impervious and pervious lands.

The Brooks Park bioretention project is in the design phase and the estimated reductions were taken from the runoff reduction spreadsheet for nitrogen and phosphorus; the total suspended sediment removal was based on the use of Chesapeake Bay Program efficiencies.

Project	Brooks Park Bioretention		TN	TP	TSS
<b>Date Planned</b>	2017	<b>Efficiencies</b>	Initial load reduction from design – see below		90%
<b>Drainage Area</b>	3.45	<b>Est. Reductions*</b>	10.62	1.23	312.79
<i>Impervious</i>	<i>0.62</i>	<b>Calculation Method</b>	Runoff Reduction Method spreadsheet from design plan (TN,TP); Ches Bay Efficiencies for Bioretention A/B soils, no underdrain (TSS)		
<i>Pervious</i>	<i>2.83</i>				
<i>Forest</i>	<i>0.00</i>	<b>Depth Treated</b>	1 in.		

*Est. Reduction Calculation Details	
TN	Initial TN Reduction = 12.05 (from runoff reduction spreadsheet)
	$TN \text{ Baseline Reduction} = [0.04221 (\text{Loading Rate Urban Impervious}) * 20 * 0.62 (\text{Unregulated Impervious Acres Draining to Facility})] + [0.01602 (\text{Loading Rate Urban Pervious}) * 20 * 2.83 (\text{Unregulated Pervious Acres Draining to Facility})] = 1.43$
	Creditable TN Reduction = 12.05 – 1.43 = 10.62
TP	Initial TP Reduction = 1.45 (from runoff reduction spreadsheet)
	$TP \text{ Baseline Reduction} = [0.01128 (\text{Loading Rate Urban Impervious}) * 20 * 0.62 (\text{Unregulated Impervious Acres Draining to Facility})] + [0.0013775 (\text{Loading Rate Urban Pervious}) * 20 * 2.83 (\text{Unregulated Pervious Acres Draining to Facility})] = 0.22$
	Creditable TP Reduction = 1.45 – 0.22 = 1.23
TSS	Initial TSS Reduction = 379.23 (based on permit rate loads and 90% removal from Bay Program Established Efficiencies)
	$TSS \text{ Baseline Reduction} = [4.2397 (\text{Loading Rate Urban Impervious}) * 20 * 0.62 (\text{Unregulated Impervious Acres Draining to Facility})] + [0.24504375 (\text{Loading Rate Urban Pervious}) * 20 * 2.83 (\text{Unregulated Pervious Acres Draining to Facility})] = 66.44$
	Creditable TSS Reduction = 379.23 – 66.44 = 312.79



Project	Brooks Park Infiltration Trenches		TN	TP	TSS
<b>Date Planned</b>	2017	<b>Efficiencies</b>	59.8%	69.9%	74.9%
<b>Drainage Area</b>	5.00	<b>Est. Reductions*</b>	16.19	1.65	491.59
<i>Impervious</i>	<i>1.50</i>	<b>Calculation Method</b>	Retrofit Curves - RR		
<i>Pervious</i>	<i>1.35</i>				
<i>Forest</i>	<i>2.15</i>	<b>Depth Treated</b>	1 in.		
<b>*Est. Reduction Calculation Details</b>					
TN	Initial TN Reduction = 17.89				
	TN Baseline Reduction = [0.04221 (Loading Rate Urban Impervious) * 20 * 1.50 (Unregulated Impervious Acres Draining to Facility)] + [0.01602 (Loading Rate Urban Pervious) * 20 * 1.35 (Unregulated Pervious Acres Draining to Facility)] = 1.70				
	Creditable TN Reduction = 17.89 – 1.70 = 16.19				
TP	Initial TP Reduction = 2.03				
	TP Baseline Reduction = [0.01128 (Loading Rate Urban Impervious) * 20 * 1.50 (Unregulated Impervious Acres Draining to Facility)] + [0.0013775 (Loading Rate Urban Pervious) * 20 * 1.35 (Unregulated Pervious Acres Draining to Facility)] = 0.38				
	Creditable TP Reduction = 2.03 – 0.38 = 1.65				
TSS	Initial TSS Reduction = 625.40				
	TSS Baseline Reduction = [4.2397 (Loading Rate Urban Impervious) * 20 * 1.50 (Unregulated Impervious Acres Draining to Facility)] + [0.24504375 (Loading Rate Urban Pervious) * 20 * 1.35 (Unregulated Pervious Acres Draining to Facility)] = 133.81				
	Creditable TSS Reduction = 625.40 – 133.81 = 491.59				

### 5.2.2 Stormwater Facilities Installed Between January 2006 and July 2009

In accordance with the Chesapeake Bay TMDL Special Condition Guidance (Part IV.2 and Appendix VI), the County may receive full credit for stormwater management facilities that were initially installed on or after January 1, 2006 and prior to July 1, 2009 within the regulated MS4 service area provided that the County has submitted a full account of stormwater facilities to DEQ as part of the “Historical Data Clean-Up” effort. Facility data was submitted to DEQ by the September 1, 2015 deadline and has been revised since that time to provide more detail on facility installation dates. Two qualifying projects have been identified by the County in the Rappahannock River watershed, which are included in Appendix A. The summary of reductions from these facilities is below:

	<b>Total Nitrogen Reduction (lbs)</b>	<b>Total Phosphorus Reduction (lbs)</b>	<b>Total Suspended Solids Reduction (lbs)</b>
<b>Total</b>	7.52	1.73	660.28

### 5.2.3 Compliance Demonstration

The following table summarizes estimated baseline loads from regulated MS4 areas, 5% reduction targets, and estimated load reductions from planned projects and historical BMPs within the Rappahannock River watershed.



	TN (lbs/yr)	TP (lbs/yr)	TSS (lbs/yr)
<b>Baseline Loads</b>	<b>4,594.93</b>	<b>492.25</b>	<b>120,663.94</b>
<b>5% Reduction Targets</b>	<b>16.92</b>	<b>3.16</b>	<b>1,058.72</b>
<b>Estimated Reductions by Project</b>			
Brooks Park Bioretention	10.62	1.23	312.79
Brooks Park Infiltration Trenches	16.19	1.65	491.59
Historic BMPs	7.52	1.73	660.28
<b>Total Estimated Reductions</b>	<b>34.33</b>	<b>4.62</b>	<b>1,464.66</b>

## 6 MEANS AND METHODS TO OFFSET INCREASED LOADS FROM NEW SOURCES INITIATING CONSTRUCTION BETWEEN JULY 1, 2009 AND JUNE 30, 2014

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As previously discussed in Section 3 of this Action Plan, Stafford County has implemented an effective and more stringent stormwater management program for land development activities since 2003 with a focus on the implementation of low impact development technology for stormwater management. The County’s stormwater ordinance is driven by technology-based criteria, which is intended help designers select the most appropriate BMPs for a given site based on its imperviousness.

The County’s 2003 SWM Ordinance used technology-based requirements and mandated stormwater treatment for any increase in impervious surface exceeding 0%. This exceeded the state minimum requirement of treating increases in impervious area beyond the State default amount of 16%. Therefore, the implementation of those requirements effectively offset any increased load for new sources initiating construction between July 1, 2009 and June 30, 2014 and no further offsets are required.

As stated DEQ’s Chesapeake Bay TMDL Action Plan Guidance, “if permittees use the technology-based criteria under 9VAC25-870-96.C, no additional reductions are required under the Special Condition beyond those for the existing conditions as of June 30, 2009 under General Permit Section I.C.2.a.(6).”

## 7 MEANS AND METHODS TO OFFSET INCREASED LOADS FROM GRANDFATHERED PROJECTS BEGINNING CONSTRUCTION AFTER JULY 1, 2014

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All projects grandfathered in Stafford County are required to utilize prior technology-based County requirements mentioned above that provide equivalent treatment to the current Virginia stormwater management requirements as codified in Section 21.5-10 of the County’s Stormwater Management Ordinance. Therefore, no offsets are required for grandfathered projects in Stafford County.



## 8 LIST OF FUTURE PROJECTS QUALIFYING AS GRANDFATHERED

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Based on the content of section 7 above, it was not necessary to produce a list of future grandfathered projects. All projects grandfathered in Stafford County are required to use prior County requirements, which provide equivalent treatment to the current Virginia stormwater management requirements.

## 9 ESTIMATED COST OF COMPLIANCE

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As identified in the County’s SLAF application for the Stafford County Government Center BMP retrofit, the estimated costs of planning, design, and construction of the Bioretention Facility #1 is \$61,600, with an approximate contingency of \$2,800 for a total of \$64,400. Although this project isn’t moving forward, the cost per treated acre was used to estimate costs for the Rappahannock River projects. The County was also awarded SLAF grants for the DP257 and DP339 pond retrofits (estimated implementation costs of \$156,000 and \$127,000, respectively).

The County Government Center BMP SLAF project treated 0.46 impervious acres at a cost of approximately \$140,000 per impervious acre treated. Proposed Rappahannock River watershed projects identified in Section 5.2 treat 2.12 impervious acres. Assuming the same unit cost of \$140,000 per impervious acre treated, the projected cost of the Rappahannock River watershed projects is \$296,800.

Table 9.A summarizes the County’s best available estimate for the cost of the above projects achieving compliance with (or exceeding) the 5% reduction targets prescribed by the Chesapeake Bay TMDL Special Condition of its current MS4 permit.

*Table 9.A – Estimated Cost of 5% Compliance*

Potomac River Watershed Projects	\$ 283,000
Rappahannock River Watershed Projects	\$ 296,800
Subtotal	\$ 579,800
Contingency (25%)	\$ 144,950
<b>Total</b>	<b>\$ 724,750</b>

## 10 PUBLIC COMMENT PLAN

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The public comment process for the Stafford County Chesapeake Bay TMDL Action Plan included a presentation to the Board of Supervisors Infrastructure Committee on June 2, 2015 followed by a public comment period beginning on June 15, 2015 through June 30, 2015. In addition to being announced at the work session, the opportunity for public comment was announced on the County’s web page and through the County’s social media outlets. The draft plan was posted on the County’s website. No public comments regarding the draft Chesapeake Bay TMDL Action Plan were received as of June 30, 2015.